

## FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015

Match 1 Round 1  
Arithmetic: Percents

1) 60

2.) 6

3.) 13, 26

1) A number  $N$  is increased by 20% and 5 is added to the result. If this sum is decreased by 30%, the result is 53.9. Find  $N$ .

2) 60% of  $(X+9)$  is equal to  $(10X+3)\%$  of  $\frac{100}{7}$ . Find  $X$ .

3) 20% of the students who applied to State U. from Rufus High School were accepted. 26% of the students who applied to State U. from Buford High School were accepted. If there were 150 students in total who applied from the two high schools,  $Y\%$  of the total number of students who applied were accepted, and  $Y$  is an integer, what are all possible values for the number of students who were accepted to State U. from Buford High School.

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015

Match 1 Round 2  
Algebra I: Equations

1.) -9

2.) 1

3.) 10, 45

1.) Solve for a:  $3 - 2(a - 4(a - 1)) = 1 - 4(a - 2(a - 3))$

2) Solve for b:  $(2b + 5)(3b - 4) - (b + 4)(5b - 2) = (b + 10)(b - 3)$

3) Solve for c:

$$0.3c - \frac{c+6}{4} = \frac{c-15}{c-5}$$

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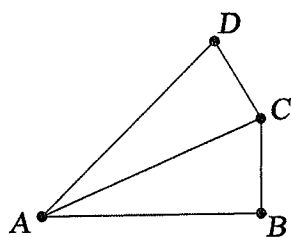
Match 1 Round 3  
Geometry: Triangles  
And Quadrilaterals

Note: Diagrams not  
necessarily to scale.

1.)  $3\sqrt{3} + 3\sqrt{5} + 6$  cm

2.)  $16\sqrt{3}$  cm<sup>2</sup>

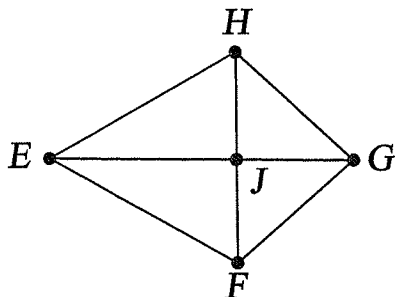
3.)  $54, 56$  cm



- 1) If angles ABC and ACD are right angles,  $AC=6$  cm, and  $BC=CD=3$  cm, find the perimeter of quadrilateral ABCD.

- 2.) A rhombus with side length 4 cm has one angle of 60 degrees. What is the product of the diagonals of the rhombus?

3. The area of a kite EFGH is  $168 \text{ cm}^2$ . The diagonals of the kite intersect at J. If JH, JG, JE, JF, EF, FG, GH, and HE are all integers, what is the perimeter of the kite?



**FAIRFIELD COUNTY MATH LEAGUE (FCML)**  
**2014-2015**

Match 1 Round 4 Algebra 2: Simultaneous Equations
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1.) a= 4      b= 10

2.) c= -6      d= -4

3.) k= -4

1.) Solve for a and b:  
 $1.25a - 0.4b = 1$   
 $0.75a + 0.01b = 3.1$

2.) Solve for c and d:

$$\frac{2}{c-4} + \frac{4}{d+3} = \frac{-21}{5}$$
$$\frac{5}{c-4} - \frac{6}{d+3} = \frac{11}{2}$$

3.) Find all values of k such that the system below has infinitely many solutions (x,y,z):

$$-2kx + 3y - z = 6$$

$$3x + ky + 2z = 13$$

$$12x + 25y - 11z = -34$$

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015

Match 1 Round 5  
Trig: Right Triangles

1.)  $12 + 4\sqrt{3} + 4\sqrt{2}$

2.)  $\frac{2\sqrt{39}}{13}$

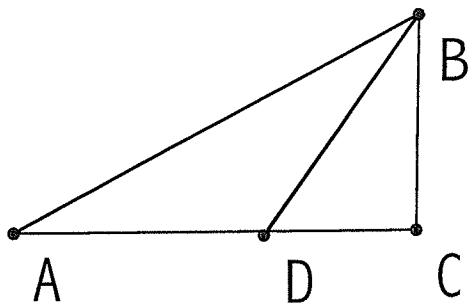
3.)  $\frac{24\sqrt{5} - 18\sqrt{2}}{10}$

Diagrams not necessarily  
Drawn to scale

1.) For  $\triangle ABC$ , an altitude is drawn from  $C$  and intersects  $\overline{AB}$  at point  $D$ . If  $\tan(\angle CBA) = 1$  and  $\sin(\angle CAB) = 0.5$  and  $CD = 4$ , what is the perimeter of  $\triangle ABC$ ?

2) A tree is located a certain horizontal distance from an observation tower. When viewed from the top of the tower, the angle of depression to the top of the tree is 30 degrees. When viewed from the bottom of the tower, the angle of elevation to the top of the tree is  $x$  degrees. If the tower is 3 times as tall as the tree, what is  $\cos(x)$ ?

3.) In triangle  $ABC$  below,  $\angle C$  is a right angle,  $\cos(\angle BAC) = \frac{2}{3}$ ,  $\cos(\angle BDC) = \frac{1}{3}$ , and  $BC = 6$ . What is the length of  $AD$ ?



## FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015

Match 1 Round 6  
Coordinate Geometry

1.)  $\frac{13}{4}$

2.)  $2\sqrt{7}$

3.)  $-\frac{13}{6}, 87/6$

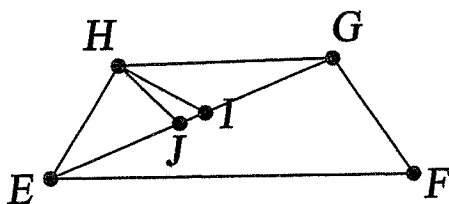
- 1.) Point A has coordinates  $(-5, -3)$ , point B has coordinates  $(3, -6)$ , and point C has coordinates  $(1, 2)$ . A median of  $\triangle ABC$  is drawn from point C to side  $\overline{AB}$ . Find the slope of the line containing the median.

- 2.)  $2x - 3y = 6$  bisects the segment with endpoints  $(a, 5)$  and  $(8, 7)$ . Find the length of the segment.

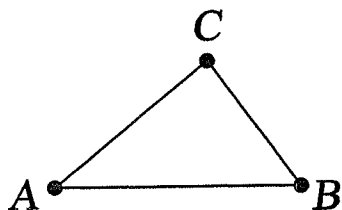
- 3.) An isosceles trapezoid has its longer base with endpoints  $(-5, 7)$  and  $(4, -5)$ . The length of the shorter base is  $\frac{2}{3}$  of the length of the longer base. One of the endpoints of the shorter base has coordinates  $(k, 6)$ . Find  $k$ .

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-15 Match 1 Team Round

- 1.)  $\frac{15\sqrt{10} - 20\sqrt{5}}{2}$  4.)  $\frac{7}{3}, \frac{9 \pm \sqrt{19}}{2}$   
 2.)  $\frac{35}{9}$  5.)  $25, -12$   
 3.)  $x = 200$   $y = 10$   $z = 50$  6.)  $20$



1. Isosceles trapezoid EFGH has  $EH = 5\sqrt{2}$  and angle HEF measures 45 degrees. The area of the trapezoid is  $75 \text{ cm}^2$ . Diagonal  $\overline{EG}$  measures  $5\sqrt{10} \text{ cm}$ . The median of  $\triangle EGH$  from angle H is drawn to point I on  $\overline{EG}$ . The angle bisector of angle EHG intersects  $\overline{EG}$  at point J. What is the length of segment  $\overline{IJ}$ ?
- 2.)  $\triangle ABC$  has vertices  $A(2,6)$ ,  $B(1,4)$ , and  $C(3,5)$ . Find the length of the altitude from point A to  $\overline{BC}$ .
- 3.)  $X\%$  of  $Y = Z - 30$ .  $Y\%$  of  $Z = 0.025X$ .  $Z\%$  of  $X = 10Y$ . Find  $x$ ,  $y$ , and  $z$ .
- 4.) In  $\triangle KLM$ , K has coordinates  $(1,3)$ , L has coordinates  $(x,5)$ , and M has coordinates  $(2,x)$ . Find all possible real values of  $x$  such that  $\triangle KLM$  is a right triangle.
- 5.) Find all values of  $d$  such that  $\frac{d+1}{2} - \frac{d+3}{4} - \frac{d+5}{6} = \frac{25}{d}$ .



- 6.) Right triangle ABC above has a right angle at C. If  $\tan(\angle ABC) = 2$  and  $AB = 10$ , what is the area of the triangle?